

determining a location of the transmitted optical signals;
determining a location of the optical array; and
automatically aligning the optical array to the substrate based upon the determined locations of the transmitted plurality of optical signals and optical array using a pick and place machine.

Amend claim 3 to read as follows:

3. (Once Amended) The method of aligning an optical array with a substrate as in claim 2 wherein the step of aligning the substrate with a set of alignment structures on an alignment fixture further comprises inserting the plurality of guide pins of the alignment fixture through a respective plurality of apertures in the substrate.

REMARKS

1. Reconsideration and further prosecution of the above-identified application are respectfully requested in view of the discussion that follows. Claims 1-32 are pending in this application. Claim 3 has been objected to because of a typographical error. Claims 1-32 have been rejected under 35 U.S.C. §102(e) as being anticipated by Kuczynski (U.S. Patent 6,356,686). After a careful review of the claims (as amended), it has been concluded that the rejections are error and, consequently, the rejections are traversed.

2. Claim 3 has been objected to because of a typographical error. In response, the wording of claim 3 has been amended as suggested by the Examiner.

3. Claims 1-32 have been rejected under 35 U.S.C. §102(e) as being anticipated by Kuczynski (U.S. Patent 6,356,686). In particular, the Examiner asserts that:

Regarding claims 1, 11, 20, and 26, Kuczynski discloses, Fig. 3, a method of aligning an optical array with a substrate (column 5, lines 59-67 and column 6, lines 1-18) comprising the steps of aligning the substrate (210) with a set of alignment structure on an alignment fixture (300); transmitting a plurality of optical signals from the fixture

through the substrate as shown in Fig. 3 and aligning the optical array (190) to the substrate (210) using the transmitted plurality of optical signals.

In response, claim 1 has been further limited to "determining a location of the transmitted optical signals; determining a location of the optical array; and automatically aligning the optical array to the substrate based upon the determined locations of the transmitted plurality of optical signals and optical array using a pick and place machine". Support for the additional limitations may be found at numerous locations throughout the specification (e.g., paragraph 34, paragraphs 42-43, etc.).

It is noted next that it does not appear Kuczynski discloses all the limitations and elements in the claimed invention as asserted by the examiner. For example, the claimed invention is limited to "a pick and place machine adapted to align the optical array to the substrate using the transmitted plurality of optical signals" (claim 11), or the method step of "automatically aligning the optical array to the substrate based upon the determined locations of the transmitted plurality of optical signals and optical array using a pick and place machine" (claim 1). The specification of the claimed invention clearly supports the use of pick and place machinery to precisely align the optical array to the substrate (paragraphs 0031-0043). Figs. 5 and 6 of the claimed invention clearly illustrates the use of the pick and place machinery to achieve precision placement of the optical array to the substrate. More specifically, an optical recognition module 70 finds recognition marks on the active surface of the array (paragraph 0037). Additionally, an optical source (60) and receiver (62), separate from the transmitting or receiving optical array (24), may be used with the pick and place machine to locate the position of the optical fibers.

In contrast to the claimed invention, Kuczynski does not teach or suggest the use of pick and place machinery to precisely align the optical array to the substrate. Rather, Kuczynski teaches of the use of "precision stages driven by an appropriate algorithm..." (column 6 lines 2, 3). Using precision stages to properly align the die (230) requires detecting light from die (230) in the case of a transmitter, or receiving light from the die (230) in the case of the receiver and may require many precision stages of manual or semi manual method steps as described in the specification (see, for example, paragraph [0002]). However, as would be abundantly clear to

those of skill in the art, the use of prior art algorithms detailing the manual or semi manual method steps of the prior art does not teach or suggest the use of pick and place machinery for use in the alignment process.

If the Examiner believes that Kuczynski or some other reference satisfies the claim limitations of claims 1, 11 and 26 regarding the use of pick and place machinery in this context, then she is respectfully requested to point out such reference as required by 37 C.F.R.

§1.104(d)(1). If the Examiner is relying upon her own personal knowledge, then she is respectfully requested to provide an affidavit establishing the basis of such knowledge as required by 37 C.F.R. §1.104(d)(2).

Additionally, Kuczynski is not drawn to "...aligning the optical array to the substrate..."(claim 1); but, instead, to "align optical fibers (190) in an optical coupler (300) with VCSEL's (235)", (column 5 lines 61-63). FIG. 4 of Kuczynski clearly shows the optical connector (300) attached to the carrier (210) and the die (230). In contrast, the claimed invention is drawn to aligning the optical array 24 to the substrate 20 (e.g., see paragraph [0025] of the specification). Since Kuczynski fails to teach these claim limitations, the rejection is believed to be improper and should be withdrawn.

Furthermore, Kuczynski fails to teach or suggest the step of transmitting optical signals through the substrate. The specification of the claimed invention clearly teaches transmitting a plurality of optical signals "through a body of the substrate." (paragraph 0032). Fig. 5 clearly shows optical signals transmitted through the body of the substrate. In contrast, Kuczynski teaches, "...a gap of greater than about 50 micrometers exists between VCSEL's 235 on die 230 and optical fibers 190 in optical coupler 300." (column 6, lines 6-8). Kuczynski goes on to teach that the gap is filled with an encapsulant and not a substrate (column 6, lines 19-32). As would be well understood by those of skill in the art, a gap filled with an encapsulant does not even remotely conform to the generally understood meaning of the term substrate. Since Kuczynski fails to teach this claim limitation, the rejection is believed to be improper and should be withdrawn.

Claim 20 is limited to "identifying a first plurality of registration marks in the alignment fixture with a first recognition module; identifying a second plurality of registration marks on the

optical array with a second recognition module; and attaching the optical array to the substrate”.

Since Kuczynski does not use an alignment fixture, there is no first and second registration marks. Since there are no first and second registration marks, the rejection is improper and should be withdrawn.

Claim 26 is limited to “means for identifying a first plurality of registration marks in the alignment fixture; means for identifying a second plurality of registration marks on the optical array; and means for attaching the optical array to the substrate”. Since Kuczynski does not use an alignment fixture there is no “means for identifying a first plurality of registration marks in the alignment fixture; means for identifying a second plurality of registration marks on the optical array; and means for attaching the optical array to the substrate”. Since Kuczynski lacks at least these elements, the rejection is believed to be improper and should be withdrawn.

4. Allowance of claims 1-32, as now presented, is believed to be in order and such action is earnestly solicited. Should the Examiner be of the opinion that a telephone conference would expedite prosecution of the subject application, he is respectfully requested to telephone applicant's undersigned attorney.

Respectfully submitted,

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Marked up Claims

1. A method of aligning an optical array with a substrate, such method comprising the steps of:

aligning the substrate with a set of alignment structures on an alignment fixture;
transmitting a plurality of optical signals from the fixture through the aligned substrate;
determining a location of the transmitted optical signals;
determining a location of the optical array; and

automatically aligning the optical array to the substrate [using] based upon the determined locations of the transmitted plurality of optical signals and optical array [and] using a pick and place machine.

3. The method of aligning an optical array with a substrate as in claim 2 wherein the step of aligning the substrate with a set of alignment structures on an alignment fixture further comprises inserting the [a] plurality of guide pins of the alignment fixture through a respective plurality of apertures in the substrate.